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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,728	12/20/2001	Qixu Chen	146712002800	5591

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EXAMINER

BERNATZ, KEVIN M

ART UNIT

PAPER NUMBER

1773

DATE MAILED: 03/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/022,728	Applicant(s) CHEN ET AL.	
	Examiner Kevin M Bernatz	Art Unit 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2,4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Preliminary amendments to the specification, filed on February 13, 2002, have been entered in the above-identified application.

Specification

2. The disclosure is objected to because of the following informalities: pages 4 and 5 contain highlighted text which is not dated/initialed and may cause problems in printing. Applicants are requested to provide replacement pages 4 and 5 without highlighting (also see Paragraph 3, below).

3. The disclosure is objected to because of the following informalities: Applicants refer to a co-pending application by the attorney docket number and not the U.S. serial number attached to the case (which allows the public to more easily locate the co-pending application). Applicants are requested to replace "SEA 2758" on page 4 with the correct U.S. Patent Office serial number.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3, 6, 9 – 16 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Bian et al. (U.S. Patent App. No. 2001/0024742 A1).

Regarding claims 1, 11 and 20, Bian et al. disclose a magnetic recording medium comprising: a non-magnetic substrate (*Figure 2 – element 10 and Paragraph 0021*), a B2-structured ruthenium-aluminum (RuAl) containing underlayer (*element 14; Paragraph 0023; and claims 1 and 13*) comprising a (200) crystallographic orientation (*Paragraphs 0031 and 0032; and claim 14*); and a magnetic layer (*element 20*) comprising a Co (11.0) crystallographic orientation (*Paragraph 0031*).

Regarding claim 3 and 12, Bian et al. disclose RuAl alloys meeting applicants' claimed limitations (*Table 1*).

Regarding claims 6 and 13, Bian et al. disclose a chromium-containing second underlayer (*Figure 2 – element 16 and Paragraph 0023*) disposed between the RuAl underlayer and the magnetic layer.

Regarding claims 9 and 15, Bian et al. disclose magnetic layers meeting applicants' claimed limitations (*Paragraph 0023 and 0057*).

Regarding claims 10 and 16, Bian et al. disclose thickness values meeting applicants' claimed limitations (*claim 12*).

Regarding claim 14, Bian et al. disclose a CoCr layer meeting applicants' claimed limitations (*Figure 2 – element 18; and Paragraphs 0042 and 0045*).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. as applied above, and further in view of Lal et al. ('924), Okumura et al. (U.S. Patent No. 5,480,733) and applicants' admissions.

Bian et al. is relied upon as described above.

Bian et al. fail to disclose the non-magnetic substrate being textured, nor an OR-Mrt of more than about 1.05.

However, Okumura et al. teach that "examples having mechanical texture show increased anisotropy and improved coercive force" (*col. 6, lines 56 – 60*), wherein the "anisotropy" referred to by Okumura et al. is actually the OR-Hc (orientation ratio of Hc(circumferential) to Hc(radial) – see Table 1). Both Lal et al. and applicants' provide further evidence that it is known in the art that for longitudinal recording, an increased orientation ratio (i.e. ~ 1.50 or higher) results in improved S/N and an improved

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longitudinal medium (*Lal et al.: Figure 3; Table 1; and col. 7, lines 36 – 44; applicants' specification: page 6, lines 3 – 16*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. to mechanically texture the substrate as taught by Okumura et al. in order to increase the orientation ratio to above 1.05, which results in an improved longitudinal recording medium having increased coercive force and improved S/N.

8. Claims 4, 7, 8, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. as applied above, and further in view of either Chen et al. (U.S. Patent No. 6,010,795) or Chen et al. (WO98/16923). The Examiner notes that both Chen et al. references disclose identical subject matter (US '795 is the U.S. equivalent of WO '923) and the Examiner will only cite relevant sections from US '795 in the following rejection.

Bian et al. is relied upon as described above.

Regarding claims 4 and 17, Bian et al. fail to disclose a sputter-deposited oxidized NiP film on a non-metallic substrate.

However, Chen et al. ('795) teach that sputter depositing an oxidized NiP film on a non-metallic substrate results in a B2 underlayer exhibiting improved (200) orientation and a (1120)-oriented magnetic layer possessing high coercivity and suitable for high density longitudinal recording (*col. 3, lines 18 – 20 and 60 – 64; col. 5, lines 3 – 11 and 28 - 37; col. 9, lines 45 – 49; col. 10, lines 1 – 25; and claim 1*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. to include a sputter deposited oxidized NiP layer on a non-metallic substrate as taught by Chen et al. ('795) in order to improve the (200) orientation in the B2 RuAl layer, resulting in an improved (1120)-oriented magnetic layer possessing high coercivity and suitable for high density longitudinal recording.

Regarding claims 7 and 19, Chen et al. ('795) disclose phosphorus contents meeting applicants' claimed limitations (*Table 4*). The exact phosphorous content is a cause effective variable in terms of the crystallization temperature of the NiP. It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the phosphorous content through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Chen et al. ('795) further disclose surface oxidizing the NiP layer in a variety of conditions (*col. 5, lines 28 – 47 – and disclosure of 08/586,529, incorporated by reference and cited below*). The examiner deems that the oxygen content in the top 50 Å (i.e. a "surface oxidation") is a cause effective variable based on the time and temperature of oxidation, and affects the roughness and crystal growth of the subsequent layers. It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the surface oxygen content through routine experimentation.

Regarding claim 8, Chen et al. ('895) disclose oxidized NiP layers meeting applicants' claimed thickness limitations (*col. 5, lines 50 - 52*).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. in view of either Chen et al. ('795) or Chen et al. (WO '923) as applied above, and further in view of Abarra et al. (U.S. Patent App. No. 2001/0033949 A1).

Bian et al. in view of either Chen et al. reference is relied upon as described above.

None of the above references disclose an Al-alloy substrate, though Chen et al. ('795) does state that the "substrates employed in the present invention can advantageously comprise any of the various substrates conventionally employed in the manufacture of magnetic recording media" (*col. 10, lines 18 - 21*).

However, Abarra et al. teach using an Al or glass substrate under an oxidized NiP layer (*Paragraphs 0037 - 0038*), thereby teaching the equivalents of Al-alloy non-magnetic substrates and glass non-magnetic substrates.

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, Al-alloy substrates and glass/glass-ceramic substrates are equivalents in the field of substrates for magnetic recording media, as taught by Abarra et al. above. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

The limitation “electrolessly plated” is a product-by-process limitation and is not further limiting in so far as the structure of the product is concerned. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. ***The patentability of a product does not depend on its method of production.*** If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” [emphasis added] *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113. Once a product appearing substantially identical is found, the burden shifts to applicant to show an ***unobvious*** difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

In the instant case, whether the NiP is sputter deposited or electrolessly plated still results in a NiP film on the substrate which can be subsequently oxidized and/or textured.

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. in view of either Chen et al. ('795) or Chen et al. (WO '923), and in view of Abarra et al. ('949 A1) as applied above, and further in view of Okumura et al. ('733).

Bian et al. in view of either Chen et al. reference and Abarra et al. is relied upon as described above.

Abarra et al. further teach that the NiP layer can be both oxidized and textured, wherein the oxidation results in improved (200) orientation of subsequently deposited

layers and the texturing improves the medium orientation ratio and reduces head stiction (*Paragraph 0038*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. in view of either Chen et al. reference to both oxidize and texture the NiP layer as taught by Abarra et al. in order to both improve the (200) orientation of subsequently deposited layers and improve the medium orientation ratio while reducing the head stiction.

None of the above references disclose electroless plating the substrate with the NiP layer, nor whether the texturing is "mechanical texturing".

However, Okumura et al. teach that sputtering and electroless plating of NiP are art recognized equivalent methods of deposition (*col. 1, lines 60 – 62*). Okumura et al. also teach that "mechanical texturing" is an art recognized method of forming circumferential texturing to improve the OR ratio and increase the running durability of the medium (*col. 1, lines 16 – 29 and 64 – 67; Table 1; and col. 6, lines 56 – 60*).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, sputtering and electroless plating are equivalents in the field of deposition methods for NiP, as taught by Okumura et al. above. In addition, mechanical texturing and non-mechanical texturing are equivalents in the field of forming circumferential texture on a NiP layer for improved orientation ratio and head stiction/running durability.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Bian et al. in view of either Chen et

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al. ('795) or Chen et al. (WO '923), and in view of Abarra et al. ('949 A1) to utilize electroless plating and mechanical texturing, since these are known equivalents to one of ordinary skill in the art for forming textured NiP layers.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Okumura et al. ('733) also disclose controlling the phosphorous content of NiP to control the crystallization temperature (*col. 4, lines 13 – 20*). Jones et al. (U.S. Patent No. 5,490,809) teach the benefit of circumferential texturing (*col. 1, lines 45 – 66*). Cao et al. (U.S. Patent No. 6,218,033 B1) teach texturing NiP layers to induce anisotropy and controlling the anisotropy to within a range of 0.8 to 1.25 (*underlined and boxed sections*). Kanbe et al. (U.S. Patent App. No. 2002/0150796 A1) teach texturing of NiP to achieve an orientation ratio of 1.4 – 1.6 (*Paragraphs 0091 and 0092*). Chen et al. (U.S. Patent No. 5,733,370) is included by reference in Chen et al. ('795) cited above and teaches various temperatures and times for the surface oxidation of an NiP layer (*col. 5, lines 47 – 58 and claims*).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



KMB
March 17, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700